A PURE EXPERIMENT TO ESTABLISH THAT THE VELOCITY OF LIGHT DOES NOT DEPEND ON THE VELOCITY OF THE SOURCE

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We propose an extremely pure experiment for the measurement in vacuum of the velocity of light emitted from a relativistically moving light source.

Since the Ritz' (ballistic) model of light propagation has still some scientific citizenship [1], we propose in this paper an experiment (called the "synchrotron" experiment) which can *directly* prove that the Ritz' model is not adequate to physical reality. We base our proposal on the experimental achievements of Kulikov et al. [2] and Bemporad et al. [3], who have observed reflection of light pulses on electrons revolving in synchrotrons.

Let us have (fig. 1.) a circular accelerator of electrons A. Short light pulses (packages of photons) are emitted by the emitter E in regular short intervals of time ΔT. These light pulses, after being reflected by the semi-transparent mirror M, pass through the slit S and reach the electrons revolving in the accelerator along the tangent to their trajectory. The photons, after being reflected by the electrons. turn back and passing through the semi-transparent mirror M are registered by the receiver R.

We can consider the revolving electrons (representing as a matter of fact a fast moving mirror) as a new source of radiation. Changing the velocity of the electrons, we change the velocity of this light source. If the velocity of light depends on the velocity of the source of radiation, then, with the increase of the velocity of the revolving electrons, the time for which the photons will cover the distance from the accelerator to mirror M will become shorter. Hence if we obtain electric pulses from the emitted and received light pulses and if we lead them to the electrodes of an eletronic oscillograph Osc, then on the screen we whould see the picture shown in the figure. Let the high peaks described by the electronic beam correspond to the emitted light pulses and the low peaks to the received pulses. If the velocity of light does

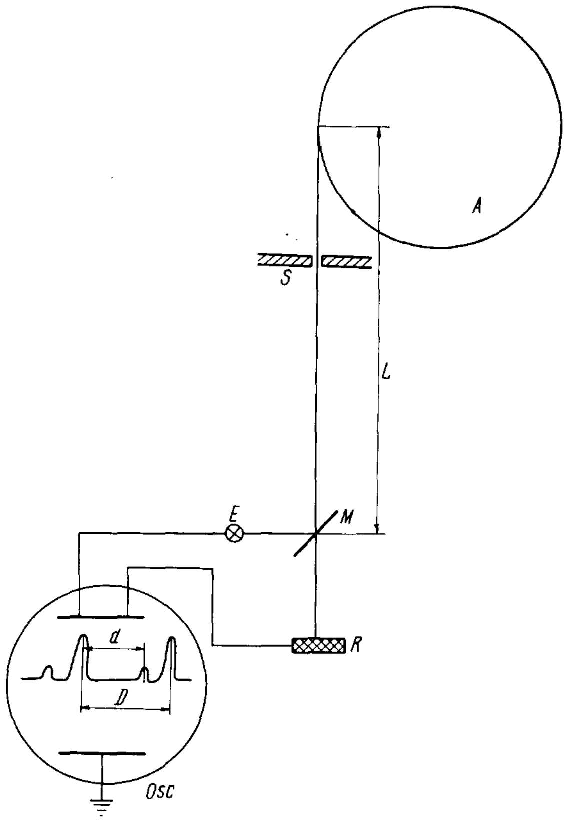

Fig. 1. The "synchrotron" experiment.

not depend on the velocity of the source of radiation, the distance between the high and low peaks will remain the same when increasing the velocity of the revolving electrons, while in the case of dependence this distance will change. Let us show this.

When the light pulses are emitted with time intervals ΔT after each other and D is the distance between them over the screen, it will be $D = k\Delta T$, where k is the constant of scanning.

Suppose that the velocity of the electrons in the accelerator is first v and then $v + \Delta v$. If the velocity of the source must be added geometrically to the velocity of light, then the velocity of the photons on the track from the accelerator to mirror M will be $c_1 = c + v$ in the first case and $c_2 = c + v + \Delta v$ in the second case.

Hence the time Δt with which the light pulses will come earlier to the receiver in the secons case will be (suppose, for simplicity's sake v, $\Delta v \ll c$)

$$\Delta t = \frac{L}{c_2} - \frac{L}{c_2} = \frac{L\Delta v}{(c+v)(c+v+\Delta v)} \cong \frac{L\Delta v}{c^2}, \qquad (1)$$

where L is the distance between the accelerator and mirror M.

If we denote by d the difference between the high and low peaks, then for their difference in the first and second cases we shall obtain $\Delta d = k\Delta t$. If we choose $\Delta T = 10^{-10}$ s, $L = 9$ m, $\Delta v = 10^6$ m/s, we obtain $\Delta t = \Delta T$, and thus $\Delta d = D$.

If the velocity of light does not depend on the velocity of the source, as our absolute space-time theory asserts, then it must be $\Delta d = 0$ for any increase of the electrons' velocity.

References

[1] J.G. Fox, Amer. J. Phys. 30 (1962) 297.
[2] O.F. Kulikov et al., Phys. Lett. 13 (1964) 344.
[3] C. Bemporad et al. Phys. Rev. 138B (1965) 1546.